

Patent claims

1. A method of purification of light hydrocarbons with cut point between 20 and 250°C, containing sulfur compounds and/or nitrogen compounds that are refractory to the usual hydrofining treatments, characterized in that it comprises

5 10 (a) a stage of oxidative polymerization of the compounds comprising an -X-CH= group in a hydrocarbon ring with 5 to 6 ring members, where X represents a sulfur atom or a nitrogen atom, in the presence of at least one oxidizing agent selected from the metal cations,

15 (b) a stage of separation of the polymers formed and of the oxidizing agent with the light hydrocarbons, and (c) a stage of oxidation of the metal cation, these stages being carried out in that order, it being possible for each of these stages to be combined with 20 at least the next stage.

2. The method as claimed in claim 1, characterized in that the metal cations are introduced in liquid form, dispersed or dissolved in an aqueous or organic 25 liquid, or supported on a solid.

3. The method as claimed in one of the claims 1 and 2, characterized in that the oxidizing metal cation has a redox potential greater than that of the molecule 30 to be polymerized in the reaction mixture.

4. The method as claimed in one of the claims 1 and 2, characterized in that the metal cation is a cation of a metallic element of the group comprising 35 iron, copper, molybdenum, manganese, cerium and vanadium, with a degree of oxidation of at least 2.

5. The method as claimed in one of the claims 1 to 4, characterized in that the metal cation is used in

the form of halide, nitrate, citrate, carboxylate, phosphate, sulfate, persulfate, borate, perborate, bidentate and polydentate complex of linear or cyclic form, comprising atoms of nitrogen, sulfur and/or oxygen as the coordinating element.

6. The method as claimed in one of the claims 1 to 5, characterized in that when the metal cation is introduced dispersed or in solution in water, the 10 reaction of polymerization is two-phase, and the polymers formed and the oxidizing cations are removed by decanting, filtration and/or extraction.

7. The method as claimed in claim 6, characterized 15 in that the reaction of polymerization is carried out in the presence of a solid selected from the group comprising charcoal, clays, zeolites, molecular sieves, amorphous aluminosilicates, alkaline silicates, silicoborates, silica-magnesias, and aluminophosphates.

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8. The method as claimed in one of the claims 1 to 7, characterized in that the metal cation is supported on a cation-exchanger crystalline or amorphous solid, containing at least one metal of the group of elements 25 comprising silicon, aluminum, zirconium, titanium, germanium, gallium and boron, alone or in combination, and with specific surface of at least 10 cm²/g.

9. The method as claimed in claim 8, characterized 30 in that the solid is selected from the clays, including the bentonites, the zeolites, including the Sapo, Alpo and Beta and the mesoporous zeolites, molecular sieves, amorphous aluminosilicates, alkaline silicates, silicoborates and silica-magnesias, this solid having a 35 pore size varying from 1.5 nm to 200 nm.

10. The method as claimed in claims 8 and 9, characterized in that the supported metal cation is obtained by bringing the solid into contact with metal

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cation salts in the form of an aqueous or organic solution, the salts being selected from the nitrates, carboxylates, sulfates, persulfates, borates, perborates, citrates, phosphates and halides of metals, 5 including iron, copper, molybdenum, manganese, vanadium and cerium.

11. The method as claimed in claim 10, characterized in that the metal salt is selected from 10 ferric chloride, cuprous chloride, molybdenum chloride, vanadium oxychloride and cerium chloride.

12. The method as claimed in one of the claims 8 to 11, characterized in that the supported metal cation 15 contains from 0.1 wt.% to 30 wt.% of the metal corresponding to said cation.

13. The method as claimed in one of the claims 8 to 20, characterized in that the supported cation is used in a fixed bed, in a moving bed, in a fluidized bed or in suspension in a liquid.

14. The method as claimed in one of the claims 8 to 25, characterized in that the stage of removal of the polymers deposited on the solid supporting the cation comprises extracting these polymers by washing with the solvent, notably by charging, by desorption by an inert gas stream selected from helium, nitrogen, carbon dioxide and water vapour, at a temperature above 100°C, 30 and/or by combustion by injecting air or oxygen, preferably after removal of light hydrocarbons that are still present in the solid support.

15. The method as claimed in claims 8 to 14, 35 characterized in that the stage of polymerization of the refractory compounds is followed by removal of the polymers formed that are present in the treated hydrocarbon, either by decanting, or by filtration, or by solvent extraction, or by distillation.

16. The method as claimed in one of the claims 1 to 15, characterized in that the stage of oxidation of the metal cation, whether or not it is supported, comprises
5 restoring the metal cations to a degree of oxidation of at least 2 by oxidation, by injecting air or liquids containing peroxides or other more-oxidizing metal cations, and optionally simultaneously increasing the temperature of the oxidizing agent.

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17. The method as claimed in one of the claims 1 to 16, characterized in that the stages of the method, taken individually or in combination, are combined in a continuous process or a batch process.

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18. The method as claimed in one of the claims 1 to 17, characterized in that the metal cation, whether or not it is supported, is reused in the first stage of the method.

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19. An application of the method as claimed in one of the claims 1 to 18 as a finishing treatment for industrial streams containing refractory sulfur and/or nitrogen compounds.

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20. The application as claimed in claim 19 to FCC gasolines and to effluents from the steam cracking plant, notably to pyrolysis gasolines.

30 21. The application as claimed in claim 19, as a finishing treatment for aromatic effluents such as benzene, toluene and xylene.

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